REMARKS

Status of the Application

Claims 1-10 are pending in the application and have been examined.

The Office Action indicates that claims 1-11 are pending and claim 11 is withdrawn from consideration. Applicant submits that claim 11 was canceled in the Amendment filed on August 7, 2009, and therefore is no longer pending. Accordingly, only claims 1-10 are presently pending in the application.

Claim Rejections

Claims 1, 2, 6-8, 10 --- 35 U.S.C. § 103(a)

Claims 1, 2, 6-8, 10 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over an article, *Evolving WCDMA*, by Hedberg *et al.* ("Hedberg") in view of an article, *Transmit Diversity applied on the CDMA/TDD cellular system*, by Hiramatsu *et al.* ("Hiramatsu"), U.S. Pat. Pub. No. 2003/0210668 to Malladi *et al.* ("Malladi"), and U.S. Patent No. 6,449,484 to Grubeck *et al.* ("Grubeck"), and further in view of U.S. Patent. No. 5,613,200 to Hamabe ("Hamabe"). Applicant traverses this rejection.

Addressing claim 1, the combination of Hedberg, Hiramatsu, Malladi, Grubeck, and Hamabe does not disclose or suggest at least "simultaneously sending the second signals to the first set and second set of the plurality of user equipments on the code-multiplexed shared channels on the first and second carrier frequencies by applying multi-user diversity through the plurality of antennas … wherein the first set and second set are assigned to the first and second

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frequencies respectively, and the user equipments in one of the first and second sets are assigned

to different antennas among the plurality of antennas," as recited in the amended claim.

Hedberg discloses, under the topic "HSDPA-improved support for best-effort services,"

simultaneous transmission for a plurality of users:

> The HS-DSCH is allocated to users on the basis of
> transmission time interval (HS-DSCH TTI). ... The HS-DSCH code
> resource consists of several channelization codes - with a spreading
> factor of 16 - set aside for the HS-DSCH. ... [T]he HS-DSCH code
> resource is allocated to one user at a time. In some cases, it can be
> beneficial to support simultaneous transmission to, say, 2-4 users
> within the same TTI using distinct parts of the set of channelization
> codes allocated for HS-DSCH." *Hedberg*, pp. 128-129.

As described above, Hedberg discloses that transmissions for a plurality of the users are

performed simultaneously. However, the reference fails to disclose or suggest that the

transmission is performed to user equipments in one of first and second sets of user equipments

which are assigned to different antennas. On the other hand, with the present exemplary

embodiments, each UE (user equipment) in a set of UEs is allocated to an antenna, and a second

signal for the corresponding set is transmitted through the corresponding allocated antenna, such

that a multi-user diversity is applied.

Further, Hedberg merely discloses using channelization codes for a simultaneous

transmission for a plurality of users, but does not disclose or suggest using a plurality of

antennas. In other words, Hedberg is silent as to the features of "the user equipments in one of

the first and second sets are assigned to different antennas among the plurality of antennas," as recited in claim 1. Malladi does not cure the deficiencies of Hedberg.

The Examiner alleges that Malladi discloses that first signals and second signals are transmitted simultaneously.

FIG. 6 of Malladi relied upon by the Examiner illustrates a transmit (TX) data processor 612 which inputs DPCH Data, HS-DSCH Data, and HS-SCCH Data. Malladi discloses that "data for the downlink DPCH, HS-DSCH, and HS-SCCH for each UE designated to receive HSDPA transmission is received and processed (*e.g.*, formatted, encoded, and so on) by a transmit (TX) data processor 612," (¶ [0093]).

While the transmit (TX) data processor 612 of Malladi inputs DPCH Data, HS-DSCH Data, and HS-SCCH Data, the reference discloses only that these three types of channel data are processed through one transmission path. However, Malladi fails to disclose or suggest that the three types of channel data are "alternatively", "sequentially," or "simultaneously" processed.

Malladi merely discloses that processing may be performed according to the W-CDMA standard:

> The processing for each channel is determined by the set of parameters associated with that channel, and may be performed as described by the W-CDMA standard documents. The processed data is then provided to a modulator (MOD) 614 and further processed (e.g., channelized, scrambled, an so on) to provide modulated data. *Malladi*, ¶ [0093].

However, based upon the above disclosure of Malladi, one of ordinary skill in the art would not derive the features that the DPCH data and the HS-DSCH data are "simultaneously" transmitted, as required by claim 1.

Further, FIG. 6 of Malladi teaches transmitting the processed data to designated user equipments (UEs) through only one antenna 624. Thus, contrary to the Examiner's allegation, the features of first signals corresponding to the DPCH and second signal corresponding to the HS-DSCH are simultaneously transmitted using a transmit diversity and a multi-user diversity, respectively, cannot be derived from the disclosure of Malladi.

In addition, the Examiner concedes that the combination of Hedberg, Hiramatsu, Malladi, Grubeck, and Hamabe does not disclose or suggest at least a method of sending first and second signals to a plurality of user equipments, the method comprising "providing a code-multiplexed shared channel for each of a first set and a second set of the plurality of user equipments, splitting the plurality of user equipments substantially evenly into a first group of user equipments which are assigned to a first carrier frequency and into a second group of user equipments which are assigned to a second carrier frequency, … wherein the first carrier frequency and the second carrier frequency are alternately assigned to the plurality of user equipments in an order in which the plurality of user equipments become active, … and the user equipments in one of the first and second sets are assigned to different antennas among the plurality of antennas," as recited in the claim.

The Examiner relies on Grubeck to allegedly disclose the claimed grouping of user equipments and antenna assignments. Grubeck, however, does not cure the deficiencies of the Hedberg-Hiramatsu-Malladi combination.

As cited by the Examiner, Grubeck discloses a cost function which takes into account various transmission-related factors in order to determine channel assignments for a base station to communicate with mobile stations (Abstract, column 8, lines 16-25). In order to *calculate the cost function*, Grubeck discloses *making assumptions* that the number of mobile stations is an even number, that two mobile stations are assigned to each channel, and that the power output demand of a given mobile station is channel-independent (column 8, lines 20-25). In other words, Grubeck merely discloses assumptions regarding mobile station position and power requirements made for performing the calculation of the cost function, but fails to disclose or suggest splitting a plurality of user equipments evenly into a plurality of groups and assigning an antenna of a set of antennas to each of the plurality of groups, as required by claim 1.

Therefore, for at least these reasons, Grubeck does not cure the deficiencies of the Hedberg-Hiramatsu-Malladi combination. Further, the Examiner has not addressed Applicant's previous arguments regarding Grubeck submitted in response to the Office Action dated May 11, 2009.

With further regard to claim 1, the Examiner relies on Hamabe to allegedly disclose that carrier frequencies can be alternately assigned to a plurality of user equipment groups. Hamabe is directed to a method of allocating radio channels. FIGS. 3 and 7-10 cited by the Examiner merely disclose *alternative* zone configurations for channel allocation based on different embodiments of the invention disclosed by Hamabe. However, Hamabe fails to disclose or suggest *alternately* assigning first and second carrier frequencies to a plurality of user equipments in an order in which the plurality of user equipments become active, as required by

claim 1. In other words, Hamabe provides *__alternative__* channel allocations according to zones

based on various embodiments of the disclosed invention.

FIGS. 3 and 7 - 10 of Hamabe illustrate channel groups composed of a plurality of

channels. Hamabe is directed to a plurality of channels, not a plurality of the user equipments.

Regarding the channels, Hamabe discloses that channel allocation is related to base stations:

> The mobile communication system has a plurality of base
> stations A, B, C, ... , G in its service area, and a plurality of sectoral
> zones Al, A2, A4, B1, B2, B3, ... , G1, G2, G3 which are covered by
> respective base stations A, B, C, ... , G.   There are available 12
> channels 1, 2, ... , 12 in the mobile communication system. ... Since
> three sectoral zones A1, A2, A3 belong to base station A, channels 1-
> 12 are divided into three groups that are assigned as the preferential
> allocation channel groups to each of sectoral zones A1, A2, A3.
> *Hamabe*, col. 5, ll 31-48.

Therefore, a channel allocation of Hamabe has nothing to do with the user equipments,

but instead is related to sectoral zones of a base station. Here, the sectoral zones of the base

station indicate service areas, and it is well known to those skilled in the art that the sectoral

zones are clearly different from the user equipments for performing the communication with the

base stations.

Further, first and second carrier frequencies of the present exemplary embodiments are

assigned "in order in which the plurality of user equipments become active." In a

communication system, the UEs can be randomly activated or deactivated by mobility of UEs or

by a power on/off.   However, the channels of Hamabe are subordinated to sectoral zones set

fixedly by the system configuration, and the channels cannot be activated or deactivated as with

the UEs. Thus, the allocation of the channels is performed in order of a sector index and a

channel index.

In this regard, an example of a channel allocation algorithm in Hamabe is disclosed at

column 8, lines 1-16. The cited portion of the reference merely discloses selecting the specific

channels from sectoral zone XI form the channel groups, but is silent as to channel allocation

based on activation order of the UEs.

On the other hand, exemplary embodiments of the present invention ***alternately*** assign

first and second carrier frequencies to the groups of user equipments, thereby balancing

transmission power between power amplifiers. Thus, Hamabe fails to disclose or suggest at least

the claimed features alleged by the Examiner.

In view of the above, the combination of Hedberg, Hiramatsu, Malladi, Grubeck, and

Hamabe does not disclose or suggest at least a method of sending first and second signals to a

plurality of user equipments, the method comprising "providing a code-multiplexed shared

channel for each of a first set and a second set of the plurality of user equipments, splitting the

plurality of user equipments substantially evenly into a first group of user equipments which are

assigned to a first carrier frequency and into a second group of user equipments which are

assigned to a second carrier frequency, … wherein the first carrier frequency and the second

carrier frequency are alternately assigned to the plurality of user equipments in an order in which

the plurality of user equipments become active, … and the user equipments in one of the first and

second sets are assigned to different antennas among the plurality of antennas," as recited in

claim 1.

Accordingly, claim 1 is patentable over the combined references. Claims 6, 7, and 10 contain features similar to the features recited in claim 1 and are therefore patentable for similar reasons. Claims 2 and 8 are patentable at least by virtue of their dependencies from claims 1 and 7, respectively.

Claims 3-5 and 9 --- 35 U.S.C. § 103(a)

Claims 3-5 and 9 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hedberg, Hiramatsu, Malladi, Grubeck, Hamabe, and U.S. Pat. Pub. No. 2002/0145988 to Dahlman *et al.* ("Dahlman"). Applicant traverses this rejection.

The combination of Hedberg, Hiramatsu, Malladi, Grubeck, Hamabe, and Dahlman does not disclose or suggest at least the above-noted features incorporated into claims 3-5 and 9 by virtue of their dependencies from claims 1 and 7, respectively. As established above, the combination of Hedberg, Hiramatsu, Malladi, Grubeck, and Hamabe does not disclose or suggest these features. Dahlman does not cure the deficiencies of the Hedberg-Hiramatsu-Malladi-Grubeck-Hamabe combination.

The Examiner relies on Dahlman to allegedly disclose assigning a carrier frequency from a set of available carrier frequencies. Dahlman, however, does not disclose or suggest at least the features of "providing a code-multiplexed shared channel for each of a first set and a second set of the plurality of user equipments, splitting the plurality of user equipments substantially evenly into a first group of user equipments which are assigned to a first carrier frequency and into a second group of user equipments which are assigned to a second carrier frequency, ... wherein the first carrier frequency and the second carrier frequency are alternately assigned to

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the plurality of user equipments in an order in which the plurality of user equipments become active, ... and the user equipments in one of the first and second sets are assigned to different antennas among the plurality of antennas," which are deficient in the Hedberg-Hiramatsu-Malladi-Grubeck-Hamabe combination.

Accordingly, since the combination of Hedberg, Hiramatsu, Malladi, Grubeck, Hamabe, and Dahlman does not disclose or suggest all of the claimed features, claims 3-5 and 9 are patentable over the combined references.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned attorney at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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